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College and Experiment Station is a subscriber. Botanists have supported it generously, sending valuable specimens illustrating new practical results.

The supplements are intended to be scientific regardless of practical bearings. Fifty copies are prepared. Three supplements have been issued: A.—Phycomycetes; B.—Uredineae; C.—Ustilagineae.

It is desired to add to each of these and to prepare others. Much material is already in hand; more is desired. Botanists are especially requested to co-operate in the preparation of sets to illustrate their special studies as Dr. Clinton has done.

DICTYOSTELIEAE OR ACRASIEAE.

A. P. MORGAN.

Mr. Edgar W. Olive in the Cryptogamic Laboratory of Harvard University, has been studying the Acrasieæ. He has kept various members of this group of organisms in cultivation and under observation for five or six years. The results are embodied in a pamphlet of sixty pages or more, which is an admirable example of careful and critical work.

The order Acrasieæ is represented by a small group of mostly coprophilous organisms, comprising seven genera and twenty species. Knowledge of them began with the discoveries of Brefeld, Cienkowsky and Van Tieghem.

By Mr. Olive the number of species previously recorded has been nearly doubled and what is of more importance the life-histories of the species observed by him have been patiently followed out and their relation to kindred organisms clearly established.

The life-cycle of the Acrasieæ is separable into two well marked periods, one of vegetation and one of fructification. In germination the protoplasm of each spore issues forth and passes its vegetative stage as an amoeba; it absorbs nutriment, increases in size and becomes greatly multiplied by successive divisions. After a more or less prolonged independent existence as vegetating individuals the amoebæ congregate toward certain centers and form aggregations for the purpose of fructification. These colonies or *syncitia* develop into fructifications which show increasing complexity of structure from the slightly differentiated sessile aggregations of the simpler species to the complex stalked sori of those most highly developed. In the stalked forms the scramble for place and position among the amoebæ is something remarkable; for those forced to the center and compelled to take their places as rounds in the ladder, there does not appear to be any further use; only upon the most exalted individuals is there conferred immortality. The ultimate purpose is the production of naked masses of resting bodies, the *spores;* these spores in some of the species are naked protoplasts, in others they are regularly invested with a cell-wall. The varying details in the development of the fructifications furnish the characteristic differences for the genera and species.

Mr. Olive's studies make it clear that there is neither homology nor analogy between the *plasmodium* of the Myxomycetes and the *syncitium* of the Acrasieæ. The plasmodium is a complex protoplast, the cytoplasm of the individual amœbæ fusing completely. The syncitium is a compound protoplast, an aggregation of individual protoplasts; at any stage in its development the colony may be separated into its component members. In the one there is continuous nuclear division, in the other no nuclear changes have been observed. Furthermore, the plasmodium is the final vegetative condition, while the syncitium is the initial fructifying stage.

In SAPPINIA the resting stage consists either of a single encysted individual or of many individuals encysted in masses at the ends of projections of the substratum. It may be regarded as a transitional form from the true Amoebæ. There are two species.

In GUTTULINOPSIS the spore-clusters or *sori* are usually stalked and composed of spores that have no cell-wall. This genus is represented by three species.

GUTTULINA differs from Guttulinopsis in that the spores have a definitive protective cell-wall. It contains four species.

The genus ACRASIS is quite abnormal. It is defined as a chain of spores terminating a simple stalk. The spores in the single species are globose, the surface roughened and of a deep violet color; they are 10-15 mic. in diameter, much larger than in other species of the order. Its habitat is quite different too, on the sediment of beer. We much regret that Mr. Olive was unable to find this singular organism.

DICTYOSTELIUM is the principal genus both in the character of its development and in the number of its species. It has tall stalked sori sometimes more than a centimeter in height; the spores are invested with a cell-wall. There are seven species, two or three of them quite common.

POLYSPHONDYLIUM is a branched form of Dictyostelium. It is possible that the distinction is not great enough to warrant the retention of the two as distinct genera. There are three species.

In COENONIA the sorus is globular, borne at the summit of a stalk, which is dilated into a sort of cupule, in which the sorus is supported. One species.

Four of these genera and thirteen species occur in this country and have been cultivated by Mr. Olive.

For the method of work and detail of observations, the reader must seek the splendid essay. The interest of it is all lost in such a bare outline as we must necessarily give; hence any dissent from the original must be taken as mere suggestion and any fault-finding as extremely superficial.

On page 493, first line *Arcyriaceae* is probably intended instead of *Physaraceae*. The species of Arcyria and also some species of Hemiarcyria fulfill the conditions mentioned.

The physiological phenomena are as a general thing presented cautiously; we are, however, rather disposed to cavil at the statement on page 489, and elsewhere that "the individuals during the fructifying period *probably in response to some chemotropic stimulus,* unite to form colonies." Every physiological process is dependent upon both internal and external factors; the specific shape and nature of an organism are inherited properties; from an acorn nothing but an Oak can develop. See Pfeffer.

Our dislike of the *pseudo* prefix is apparent. We may have to tolerate the venerable *pseudopodium,* but not the rest. This evasive prefix is, however, in common use and its employment by Mr. Olive is not original. The term *syncitium,* we are aware, has been otherwise made use of, but its application both by Vines and Verworn, for example, seems to us superfluous; it is eminently applicable to the assembling amoebæ of the Acrasieæ.

Finally, where shall we place these organisms? In their active assimilating and reproductive stage, they are simple Amoebæ. It would be interesting to know how they come to their peculiar habitat; did they survive in the drinking water or did they crawl out upon the land, catching at straws by the way? In view of this habitat their appearance in their present shape cannot be extremely ancient. The Sporozoa are not near akin to them. Their relation to the Amoebidæ is closer than is that of the Myxomycetes. The fact is, both are short divergent members from the advancing animal line.

The Vegetable Kingdom is not in line with any of the Protozoa. It is safe to claim that the bacterial cell is the lowest cell-form that can without question be called a plant; from this all other vegetation has been derived. The systematic succession between plant and animal does not seem to us so well established, as some would have us think; there is much confusion in this respect, among the lower organisms. As having a bearing upon this subject, we can here only refer to Thaxter's Myxobacteriaceæ.